Note Informal Examiner's Amendment

CLAIMS

1. A non-linear optical device comprising a planar optical waveguide, at least a section of the planar optical waveguide being operative to generate an optical output from at least a portion of an optical input having an input bandwidth by means of a non-linear optical process, the optical output having a wavelength within an accessible bandwidth, wherein the planar optical waveguide is operative to enhance the accessible bandwidth such that the ratio of the accessible bandwidth to the input bandwidth is at least 4, the term "bandwidth" being defined here as the wavelength interval beyond which the spectral radiant intensity remains below a level of -30 decibels (0.001) of the maximum value.

2. A non-linear optical device according to claim 1, wherein the ratio of th accessible bandwidth to the input bandwidth is at least 10.

3. A non-linear optical device according to claim 1, wherein the planar optical waveguide has a core layer with a refractive index of at least 1.7.

4. A non-linear optical device according to claim 1 , wherein the planar optical waveguide has a core layer which comprises a material selected from a group including the oxides of tantalum, hafnium, zirconium, titanium and aluminium.

5. A non-linear optical device according to claim 1, wherein the planar optical waveguide has a core layer which comprises a material doped with a rare earth element.

6. An optical wavelength converter according to claim 1, wherein the planar optical waveguide has a core layer which comprises silicon nitride (SiN).

7. A non-linear optical device according to claim 1, wherein the accessibl bandwidth is at least 200nm.

8. A non-linear optical device according to claim 1, wherein the accessible bandwidth is at least 500nm.

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9. A non-linear optical device according to claim 1, wherein th ratio of the accessible bandwidth to the input bandwidth is non-linearly dependent on ~~th~~ the intensity

of the optical input.

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10. A non-linear optical d vice according to claim 1, wherein the non-linear optical process comprises one or more processes selected from a group which includes self-phase modulation, self-focussing, four-wave mixing, Raman scattering and soliton formation.

11. A non-linear optical device according to claim 1, wherein the planar waveguide comprises a ridge.

12. A non-linear optical device according to claim 1, wherein the planar waveguide comprises a rib.

13. A non-linear optical device according to claim 1, wherein a portion of the planar waveguide is tapered.

14. A non-linear optical device according to claim 1, wherein a portion of the planar waveguide includes a structure, the structure being operative to modify the optical input and/or optical output.

15. A non-linear optical device according to claim 14, wherein the structure comprises a photonic structure.

16. A non-linear optical device according to claims 14, wherein the structure is operative to filter the optical input and/or optical output.

17. A non-linear optical device according to claims 14, wherein the structure is operative to compress temporally the optical input and/or optical output.

18. A non-linear optical device according to claims 14, wherein the structure is operative to modify the optical dispersion characteristics of the planar optical waveguide.

19. A non-linear optical device according to claim 1, wherein the planar optical waveguide comprises a further planar layer which is operative to modify the optical dispersion characteristics of the planar optical ~~wav guide~~ waveguide.

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20. An optical continuum source comprising a non-linear optical d vice according to claim 1, wherein the optical output has an optical spectrum comprising an optical continuum as a result of non-linear broadening of the optical input.

21. An optical continuum source according to claim 20, wherein the degree of non-linear broadening is by at least a factor of 4.

22. An optical continuum source according to claim 20, wherein the optical continuum has a bandwidth of at least 200nm.

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23. An optical continuum source according to claim 20, wherein the degree of broadening is non-linearly dependent on the peak intensity of the optical input.

24. An optical continuum source according to claim 20, wherein the non-linear optical process is seeded with an optical seed input.

25. An optical parametric oscillator comprising a non-linear optical device according to claim 1 and means for providing optical feedback at a wavelength within the accessible bandwidth.

26. An optical parametric oscillator according to claim 25, wherein the optical feedback means is provided at least in part by a photonic structure.

27. An optical parametric amplifier comprising a non-linear optical device according to claim 1 adapted to receive a further optical input to be amplified at a wavelength within the accessible bandwidth.

28. An optical system including a non-linear optical device according to claim 1.

29. An optical continuum source comprising a planar optical waveguide, at least a section of the planar optical waveguide being operative to generate an optical output having an output bandwidth from at least a portion of an optical input having an input bandwidth by means of a non-linear optical process, wherein the optical output has an optical spectrum comprising an optical continuum as a result of non-linear broadening of the optical input, the planar optical waveguide being operative to nhance the ratio of the output bandwidth to the input bandwidth to at least 4, the term "bandwidth" ~~b ing~~ being defined here as the wavelength interval beyond which the spectral radiant intensity

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remains below a level of -30 decibels (0.001) of the maximum value.

30. An optical continuum source according to claim 29, wherein the output bandwidth of the optical continuum is at least 200nm.

31. An optical continuum source according to claim 29, wherein a portion of the planar waveguide includes a structure, the structure being operative to modify the optical dispersion characteristics of the planar optical waveguide.

32. An optical continuum source according to claim 31, wherein the structure comprises a photonic structure.

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33. An optical continuum source according to claim 31, wherein the optical dispersion characteristics of the planar optical waveguide are modified to achieve zero dispersion at points along the waveguide.

34. An optical continuum source according to claim 31, wherein the optical dispersion characteristics of the planar optical waveguide are modified to achieve normal dispersion at a predetermined wavelength.

35. An optical parametric oscillator comprising:

a planar optical waveguide, at least a section of the planar optical waveguide being operative to generate an optical output from at least a portion of an optical input having an input bandwidth by means of a non-linear optical process, the optical output having a wavelength within an accessible bandwidth, wherein the planar optical waveguide is operative to enhance the accessible bandwidth such that the ratio of the accessible bandwidth to the input bandwidth is at least 4, the term "bandwidth" being defined here as the wavelength interval beyond which the spectral radiant intensity remains below a level of -30 decibels (0.001) of the maximum value; and,

means for providing optical feedback at a wavelength within the accessible bandwidth.

36. An optical parametric oscillator according to claim 35, wherein the accessible bandwidth is at least 200nm.

37. An optical parametric oscillator according to claim 35, wh rein a portion of the planar waveguide includes a structure, the structure being operative ~~op rative~~ to modify the

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optical dispersion characteristics of the planar optical waveguide.

38. An optical parametric oscillator according to claim 35, wherein the structure comprises a photonic structure.

39. An optical parametric oscillator according to claim 35, wherein the optical dispersion characteristics of the planar optical waveguide are modified to achieve negative (anomalous) dispersion at a predetermined wavelength.

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40. An optical parametric amplifier comprising a planar optical waveguide for receiving a first optical input having a first input bandwidth and a second optical input having a second input bandwidth, at least a section of the planar optical waveguide being operative to amplify the second optical input by generating an optical output from at least a portion of the first optical input by means of a non-linear optical process, th optical output and the second optical input having a wavelength within an accessibl bandwidth, wherein the planar optical waveguide is operative to enhance th accessible bandwidth such that the ratio of the accessible bandwidth to the first input bandwidth is at least 4, the term "bandwidth" being defined here as the wavelength interval beyond which the spectral radiant intensity remains below a level of -30 decibels (0.001) of the maximum value.

41. An optical parametric amplifier according to claim 40, wherein the accessibl bandwidth is at least 200nm.

42. An optical parametric amplifier according to claim 40, wherein a portion of the planar waveguide includes a structure, the structure being operative to modify the optical dispersion characteristics of the planar optical waveguide.

43. An optical parametric amplifier according to claim 40, wherein the structure comprises a photonic structure.

44. An optical parametric amplifier according to claim 40, wherein the optical dispersion characteristics of the planar optical waveguide are modified to achieve negative (anomalous) dispersion at a predetermined wavelength.

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45. A method for enhancing the bandwidth accessible in the generation of an optical output, comprising ~~th~~ the step of providing a planar optical waveguide for receiving

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an optical input having an input bandwidth, wherein at least a section of the planar optical waveguide is operative to generate an optical output from at least a portion of ~~th~~ the optical input by means of a non-linear optical process, the optical output having a wavelength within an accessible bandwidth, wherein the planar optical waveguide is operative to enhance the accessible bandwidth such that the ratio of the accessible bandwidth to the input bandwidth is at least 4, the term "bandwidth" being defined here as the wavelength interval beyond which the spectral radiant intensity remains below a level of -30 decibels (0.001) of the maximum value.

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46. A method for generating an optical signal comprising the steps of:

receiving an optical input signal having an input bandwidth at an optical input to a planar optical waveguide;

guiding the optical input signal along the planar optical waveguide; and,

generating an optical output signal from at least a portion of the optical input signal by means of a non-linear optical process in at least a section of the planar optical waveguide, the optical output signal having a wavelength within an accessible bandwidth, wherein the planar optical waveguide is operative to enhance ~~th~~ the accessible bandwidth such that the ratio of the accessible bandwidth to the input bandwidth is at least 4, the term "bandwidth" being defined here as the wavelength interval beyond which the spectral radiant intensity remains below a level of -30 decibels (0.001) of the maximum value.

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